

NOTES.

THE announcement of the appointment by the Department of Scientific and Industrial Research and the Medical Research Committee of a Research Board to investigate the conditions of industrial fatigue comes as a welcome reminder that the importance of fatigue in industrial processes, long insisted on by those engaged in its investigation, can no longer be neglected. Fatigue, indeed, forms the dominating factor in limiting output, and its investigation during the war established facts of fundamental importance. It is right that these researches should now be co-ordinated and extended to other industrial processes where, up to now, fatigue has not been adequately investigated. The Board consists of:—Prof. C. S. Sherrington (chairman), Mr. E. L. Collis, Sir Walter Fletcher, Mr. W. L. Hichens, Dr. Edward Hopkinson, Mr. Kenneth Lee, Dr. T. M. Legge, Col. C. S. Myers, Mr. R. R. Bannatyne, and Mr. D. W. Wilson (secretary). The duty of the Board will be to initiate, organise, and promote, by research, grants, or other wise, investigations in different industries with the view of finding the most favourable hours of labour, spells of work, rest pauses, and other conditions applicable to the various processes, according to the nature of the work and its demands on the worker. The Board will be glad to receive suggestions as to any problems of the kind described. All communications should be addressed to the Secretary, Industrial Fatigue Research Board, 15 Great George Street, Westminster, S.W.1. It is a hopeful sign that, in industrial research, employers are convinced of the need for progress, and, should undue delay occur, they will be prepared to take into their own hands the prosecution of investigations and the application of results.

TEN years ago Wilbur Wright gave at Le Mans, western France, a demonstration of the practicability of aerial navigation with machines heavier than air. On Sunday, December 22, we learn from the *Times*, this notable achievement was celebrated by the laying of the foundation-stone of a monument to Wilbur Wright, erected by the people of Le Mans, in the Place des Jacobins, at the foot of the rising ground on which the cathedral stands, the presentation of a commemorative tablet to Le Mans by the Aero Club of America, and a memorial tablet and bronze wreath from the citizens of Dayton, Ohio, Wilbur Wright's birthplace.

THE President's gold medal of the Society of Engineers has been awarded to Mr. T. Roland Wollaston, of Manchester, for his paper on "A Survey of the Power By-product Problem."

THE *British Medical Journal* announces the resignation of Prof. E. Roux of the directorship of the Pasteur Institute, Paris, and the appointment of Dr. A. Calmette as his successor.

IN an article on reconstruction, in the *Scientific American* for November 23, the Hon. W. C. Redfield, Secretary of Commerce to the United States, gives a short account of what is being done in the States to restore industry to a peace basis and to improve it in the future. Mr. Redfield points out that the industrial success of Germany arose out of two causes—first, the appreciation of the science which underlay each industry, its study and its application in the industry; and secondly, the training of the mind as well as the hand of the worker, so that he should understand both *how* to do a thing properly and *why* that was the proper way. Neither in Great Britain nor in America has scientific research or vocational training been conspicuous, or even visible, in industry. Both are now being introduced in America as quickly as pos-

sible. Experimental cotton and woollen mills, a paper mill, and a rolling mill have already been established, and other industrial laboratories are to follow, so that any problem which affects a whole industry can be at once worked out on a practical scale. The Federal Board for Vocational Education is distributing large and increasing sums to each State of the Union to ensure to every worker a knowledge of the *why* of his work.

At the meeting of the Illuminating Engineering Society on December 19 some particulars were given, by permission of the Ministry of Munitions, of researches which have been undertaken by two committees on the illuminating value of flares, parachute lights, etc., and on the brightness of self-luminous radio-active material. Mr. A. P. Trotter, who dealt with the former problem, showed several forms of photometers specially designed to deal with the fluctuating and very powerful light of these service flares, which in certain instances attained 130,000 c.p. The work had to be done exclusively on moonless nights, and, as experiments were conducted in the open, precautions had to be taken against the disturbing effects of wind, mist, and smoke. Several interesting results of these experiments are mentioned. It appears that nests of parallel flares give substantially a candle-power equal to the sum of the values of the constituent flares; also that the light is of the same value at different angles below the horizontal; in other words, such flares act as flames, and not in a manner resembling the crater of an electric arc. As a rule, sample flares were mounted on high poles, but they were also attached to the carrier of a military kite with the object of ascertaining the illumination that would be produced in practice when such flares are dropped from aeroplanes. The second series of experiments, described by Mr. W. C. Clinton, related to the decay in brightness of compositions containing zinc sulphide with a small admixture of radium bromide in course of time. Experiments extending over a year showed that specimens containing from 0.1 to 0.8 mg. of radium bromide per gram of composition all eventually possessed a brightness of the order of 0.01 foot-candle, though originally the compositions with the higher radium content were much the brighter. Experiments were made to determine the desirable depth of material by which the brightness and life are also affected. In view of the costliness of radium, such experiments are most useful in determining the minimum amount which can be usefully employed in practice. Both series of experiments afford an instructive instance of the useful work undertaken by many scientific societies during the war.

THE Registrar-General's return for the week ending December 14 shows a continued decline in the influenza epidemic. The deaths in the ninety-six great towns of England and Wales were 1885, which is only a little more than one-half of the deaths in the preceding week, and is lower than in any week since that ending October 12, about the first week of the epidemic. In London the deaths were 322, which is less than one-half of those in the preceding week, and also fewer in any week since that ending October 12, which was the first week in which the number of deaths in London exceeded twenty. The *Times* of December 18 gives the following as the "influenza world-toll," from its medical correspondent:—"Though estimates of deaths over the whole world from any single epidemic are very difficult to form, there seem to be reasonable grounds for believing that some 6,000,000 persons have perished of influenza and pneumonia during the past twelve weeks. . . . Never since the Black Death has

such a plague swept over the face of the world; never, perhaps, has a plague been more stoically accepted. In India alone more than 3,000,000 deaths occurred. Bombay had 15,000 of these; Delhi, with a population of only 200,000, had 800 deaths a day; the Punjab lost 250,000 persons. South Africa suffered no less severely."

THE death is announced, at eighty-three years of age, of Dr. Artemas Martin, of the U.S. Coast and Geodetic Survey. From an obituary notice in *Science* we learn that early in life Dr. Martin began contributing problems and solutions to various magazines. In 1877, while engaged in market-gardening for a livelihood, he began the editing and publishing of the *Mathematical Visitor*, and in 1882 he followed this up with the *Mathematical Magazine*. He also contributed numerous papers to other mathematical journals in America and abroad. He was an authority on early mathematical text-books, and collaborated with Dr. Greenwood in the "Notes on the History of American Text-books on Arithmetic." In 1885 Dr. Martin was appointed librarian of the U.S. Coast and Geodetic Survey, where his wide knowledge of mathematics made him of great service. In 1898 he was made computer in the Division of Tides, which place he held until his death. Honorary degrees were conferred upon him by several American universities, and he was a member of numerous learned societies. Dr. Martin's memory is to be perpetuated in the Artemas Maftin Library of the American University at Washington, D.C., and at the same university there is to be an Artemas Martin lectureship in mathematics and physics, endowed by Dr. Martin.

WE regret to record the death of Col. William Vincent Legge, who was born in Tasmania in 1840, and died there on March 25, 1918. Educated in England, France, and Germany, Col. Legge entered the military academy at Woolwich, and received a commission in the Royal Artillery in 1862. He early evinced his partiality for ornithology, and finally became a notable authority on that science. Of his thirty-five scientific papers, the first is to be found in the *Zoologist*, to which journal, in 1865, he communicated a paper on birds found nesting in Essex. From 1868 to 1877 he was stationed in Ceylon, and it was during this period that he laid the foundations of what was to be his *magnum opus*, namely, "The Birds of Ceylon," a large quarto volume of 1238 pages, with thirty-four hand-coloured plates depicting the endemic species, and a map showing the faunal areas. This valuable work was issued in parts between 1878 and 1880, and was largely based upon specimens which its author had collected. In 1883 Col. Legge returned to the family estate in Tasmania, and published a series of papers, chiefly on Australian birds. In 1884 he was president of the Australian Association, and delivered a suggestive address on the zoogeographical relations of the Ornis of the Australian sub-regions. He was one of the founders, and the first president, of the Royal Australasian Ornithologists' Union, a member of the Royal Society of Tasmania, and a Colonial member of the British Ornithologists' Union.

DR. WILLIAM G. SMITH, Combe lecturer in general and experimental psychology in the University of Edinburgh, died on November 22, one of the many victims of the influenza epidemic. Dr. Smith was born on August 25, 1866, the youngest son of the Rev. Walter Smith, Half Morton, Dumfriesshire. Entering the University of Edinburgh in 1883, he graduated with first-class honours in philosophy in 1889, and afterwards acted for two years as assistant to the professor of moral philosophy. The founda-

tions of a broader study of psychology in this country had just been laid by Prof. Ward's treatise in the "Encyclopædia Britannica" and William James's "Principles of Psychology," and the experimental methods of approach developed in Germany were also attracting the younger men. Dr. Smith spent fully two years in Germany studying experimental psychology, chiefly in Wundt's laboratory at Leipzig. He graduated Ph.D. in 1894 with a thesis on "Mediate Association," the substance of which appeared in an article in *Mind* in the same year. This was followed by another in 1895 on "The Relation of Attention to Memory," based partly on his Leipzig studies and partly on further investigations carried out in the physiological laboratory, Oxford, under Burdon Sanderson. In 1895 Dr. Smith went to America, and, after working some time with Münsterberg in the Harvard psychological laboratory, was appointed professor in Smith's College, Northampton, Mass. He held this position for some years, but eventually preferred to return to this country, where he became, successively, lecturer on psycho-physics in King's College, London, and assistant lecturer in physiology in the University of Liverpool. During these years Dr. Smith contributed a number of papers, based on experimental investigations, to the *Psychological Review*, the *Archives of Neurology*, *Mind*, and the *British Journal of Psychology*, in several of which he continued and extended his researches on memory. When an independent lectureship in psychology was established in the University of Edinburgh in 1906, he was chosen to be its first occupant, and his main energies since that time have been devoted to the equipment and organisation of the department. This he had carried through with marked success, and under his guidance the subject has taken an important place in the university curriculum.

THE Journal of the Academy of Natural Sciences of Philadelphia (second series, vol. xvi., part 4, 1918) contains a finely illustrated monograph by Mr. Clarence B. Moore entitled "The North-Western Florida Coast Revisited." The aborigines of Florida were in the habit of "killing" the vessels interred with the dead by breaking a hole in the base, thus freeing their souls to accompany those of their owners to the life beyond. Doubtless the more thrifty mourners regretted this destruction of serviceable pottery, and hence arose a refinement of the custom, the manufacture of mortuary vessels of inferior ware, and provided with a basal perforation made before the firing of the clay. A large collection of these interesting vessels made by Mr. Moore is illustrated and described in this interesting monograph.

IN *Folk-lore* (vol. xxix., No. 3, September, 1918) Dr. W. Crooke discusses the tales of the prentice pillars and the architect and his pupil. We have in this country instances of such pillars at Roslin Abbey and Melrose, and windows in Rouen Cathedral, where the story is current that the master, through envy, is said to have killed his pupil who constructed the work. In a second form of the tale the builder or architect is said to have fallen a victim to the jealousy of his employer, who feared that he might lose his reputation if the workman transferred his services to another master. Of this type of story numerous instances are quoted from India and other parts of the East. It has been suggested by Mr. H. A. Rose that the legend is based on the idea of a foundation sacrifice, the most appropriate victim being the person responsible for the work. But this does not easily explain some forms of the story, and further examples must be collected before the problem can be finally solved.

DR. A. PIJPER has described certain diffraction phenomena observed with cultures of micro-organisms by means of which the size of the organisms may be ascertained without direct measurement (*Med. Journal of S. Africa*, vol. xiv., 1918, p. 211). It was noticed that certain colonies of a bacterial plate culture viewed with ordinary daylight were colourless, but when the plate was held in the beam of an electric arc at a certain distance from, and at a certain angle to, the source of light, the colonies exhibited a blue colour. From theoretical considerations and control experiments the conclusion was arrived at that the coloration was due to a diffraction effect, the thin layer of micro-organisms acting like a grating. For the better observation of the effect the following arrangement was devised: The beam from an electric arc was parallelised by means of a condensing lens and passed through a hole in the proximal side of a closed box. In the box the bacterial plate culture was suspended, the glass of the dish being painted over with black paint except at one spot placed opposite the beam. Immediately opposite the transparent spot a second lens collected the rays, bringing them to a focus on a transparent screen forming the distal side of the box. On viewing the screen the spot in the axis of the beam is colourless, but around this a series of coloured rings spreads over the screen. Knowing the focal length of the collecting lens, and measuring the distance of any coloured ring from the axis, the size of the slits can be calculated, and, for spherical micro-organisms, the size of the slits is found to be just equal to the diameter of the organisms. This was verified by observations on various micro-organisms, the size found by the diffraction method and by microscopic measurement being practically identical.

THE last two reports of Bergens Museum, dealing with the years 1916-18, bear witness to a restriction of growth and activity caused by the war. In spite of this, much valuable work has been accomplished, and the educational influence of the museum has not lessened. Among recent accessions are several representatives of the anthropoid apes, notably a mounted group of male and female gorilla with young, and a fine skeleton of the male; a good mounted specimen of the wart-hog (*Phacochoerus*); the Scandinavian herbarium of the lately deceased J. R. Landmark, who had continued to the end his donations of plants collected by himself in remote districts; numerous prehistoric remains from recent excavations, particularly a set of miniature greenstone axes, arrow-heads, knives, scrapers, and flakes from Vaagsø, Søndmør. Dr. A. Brinkmann, head of the zoological department, has started a collection of skeletons of the various races of Norwegian domestic animals, especially pedigree individuals, for which he hopes to obtain the co-operation and pecuniary help of the agricultural department. Such a collection, as was recognised by Sir Ray Lankester when director of our own Natural History Museum, is not merely of popular interest and practical importance, but has a value for the study of morphology and heredity. During the period covered by the reports the seismographic station connected with the museum has continued its work, and we think it well to conclude by quoting a sentence that appears in each report: "The Government has, on request, appropriated 4000 kroner to the acquisition and installation of a new seismograph, which will be purchased as soon as it is possible to obtain it from Germany." British instrument-makers should note this remark.

THE little-known grain called quinoa (*Chenopodium quinoa*) is the subject of an illustrated article in the July issue of the Bulletin of the Pan-American Union

(vol. xlvii., No. 1), a journal devoted to all aspects of Latin America. It seems to be indigenous to the highlands of South America, where it has been cultivated since early times in Peru, Bolivia, Ecuador, and Chile. It is very hardy, and thrives well at altitudes of 11,000 ft., though in warmer climates it cannot compete with maize. The natives who grow quinoa use it in making a sort of bread, and it may also be treated like oatmeal or rice. Quinoa is still cultivated in a very primitive manner, and no attempts have been made to improve the grain by seed selection. The United States Department of Agriculture, however, is now experimenting with the grain in the hope of finding suitable areas where conditions of soil and climate will make it a profitable crop.

ENORMOUS quantities of timber have been used during the great war. In the first few months all available seasoned supplies were absorbed; for the remainder of the period green, unseasoned timber had to be employed, with the resultant inevitable high percentage of wastage through cracking and shakes. Large quantities of timber will be required for reconstruction purposes and restarting industries. The timber trade will therefore be in much the same position for some time to come. It will not be possible to await the period required for the natural seasoning of the material. There are several methods in operation for artificially drying timber by means of hot air. Mr. Herbert Stone in the *Quarterly Journal of Forestry* for October last discusses a method based on the use of cold air. The method is worthy of consideration. The plant required is a closed, double-roofed shed dimly lighted from the north. At the end farthest from the door a small refrigerating apparatus, such as is used in cold storage, though of smaller dimensions, is placed. By means of this a cold atmosphere is created sufficient to cause the air moisture in the shed to condense in hoar-frost, thus keeping the atmosphere continually dry. The moisture coming from the pores of the timber is thus constantly condensed in hoar-frost and got rid of, the wood drying without the risk of cracks and shakes, so often the accompaniment of hot-air drying. Mr. Stone is scarcely correct in his assertion that in the future most of our timber must be drawn from hot countries, where he recommends the method for trial. For one thing, our chief timber demands are for soft coniferous timber from the temperate regions; and, for another, the method, for various causes which will be readily appreciated by those having acquaintance with forestry conditions in the tropics, would be far more difficult of application.

THE American Geographical Society has published an index to the first sixty-four years of the Bulletin and Journal of the society. The periodical publications started in 1852, and for some years appeared intermittently, but apparently no annual index was published until 1895. The present volume will be welcomed by geographers as facilitating reference to a most valuable set of periodicals. There are references to both subjects and authors.

IN a most interesting paper in the October issue of the *Geographical Review* (vol. vi., No. 4) Mr. Edmund Heller discusses the geographical barriers to the distribution of big-game animals in East Africa. The paper is accompanied by a map showing the life-zones in the region. Mr. Heller finds that climate is the chief controlling factor, and that it operates mainly in limiting certain vegetable growths which afford food and cover to animals. Large rivers, such as the Nile and the Tana, are important barriers to big-game mammals, but seem to have little influence on smaller

mammals and reptiles. Crocodiles may assist in making a river a barrier to certain animals, though bushbucks, waterbucks, hippopotami, and elephants are not influenced by them. Antelopes and other ungulates seem to have a dread of water infested by crocodiles. The paper also considers the geographical aspects of the distribution of native tribes in East Africa.

M. MOUSSU, who made an investigational journey into north-east Morocco in 1917, has discovered a certain number of outcrops which point to the existence of petroleum deposits, especially as gypsum and gypsum-clays occur frequently in the neighbourhood. The three principal outcrops are at the Arab villages of Ouled-Slama, Kohlott, and Khairrett. The principal of these outcrops was found at the first-named place, which is a short distance from the military station of the Tleta des Cheragas. The oils are probably of a heavy or bituminous nature. They ooze out of the ground in wet weather in the form of emulsion, and there is an absence of vegetation where they occur. From the main outcrop the writer was able to collect a few litres of the product. According to the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* for September-October, 1918, this product is a heavy brown (nearly black) oil, which rises in the form of emulsion in the salt-water of the watercourse. This sample was distilled at temperatures ranging from 90° to 225° C., and gave about 96 per cent. of distillates of a density of from 800 to 830, the result being a very pure kerosene. The quantity of ether and petrol is very small indeed. It is probable that these constituents evaporate owing to the heat at the surface of the outcrops. On the other hand, the yield of lamp-oil is very high and the residue very low. Since the outcrops discovered by the author extend over several kilometres, it is reasonable to assume the existence of others.

In the *Zeitschrift des Vereines deutscher Ingenieure* for October 5 last Dr. G. Rohn discusses the question of Germany's textile requirements in the light of the feared economic boycott of that country by the Entente Powers, and briefly reviews what has already been accomplished in the way of finding substitutes. A certain amount of success has been attained in nettle cultivation. Although the yield of fibres from nettles is only 6 to 7 per cent. of the weight of the plant, the fibre has valuable properties, being very fine and smooth and strong. Since the war broke out some fifty processes for utilising nettle-fibres have been patented. It is thought that 1,000,000 hectares of lowlands could be planted with nettles, producing some 80,000 tons of fibres annually. The author also shows the progress made with wood-fibres, especially from the conifers. Experiments have been going on for some time with the view of extracting the fibres by chemical treatment, and success has rewarded the efforts of investigators in some directions. Developments have taken place, too, in the production of yarns from paper-stock, a number of companies having obtained licences to work the Türck Co.'s patents. The method of obtaining yarn from paper itself is outlined, and it is said that this method of treating wood is expected to render valuable service to Germany in future.

SINCE 1914 France has made great strides in the production of acetate of cellulose for use as an aeroplane dope, for kinematograph films, and for non-inflammable celluloids for various general purposes. The *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* for September-October last gives particulars of what has been accomplished in the manu-

facture both of the acetate of cellulose itself and of the acetic acid, solvents, etc. Various processes are employed, and the manufacture is carried on at a number of chemical factories which had had no experience in its production until the necessities of war made it imperative for them to take it up.

In the *Journal of the Washington Academy of Sciences* for October 19 Mr. L. W. Austin describes a new method of using contact detectors in radio-telegraphic measurements. The sensitive vacuum and tellurium platinum thermo-elements have resistances which vary with the current, and are either slow in action or difficult to make and transport. They have therefore been replaced in the Naval Radio Laboratory of the United States by contact detectors in series with high-resistance galvanometers shunted by paper condensers of a microfarad capacity. The detector and galvanometer are shunted by a resistance of a few ohms. The sensitivity of the arrangement is greater than that of the best vacuum thermo-elements of the same equivalent resistance, and the deflections are proportional to the square of the radio current, except in the case of the galena detector, which shows a slight deviation from the law.

WHEN a canal connects two rivers situated at different levels, and the ordinary chamber lock is used to pass traffic from the higher to the lower level, the water taken from the higher-level stream is often considerable. A German firm has now patented a system of "dry" lock (*Zeitschrift des Vereines deutscher Ingenieure*, October 19 and 26, 1918), in which the ordinary lock-chamber is replaced by a concrete basin permanently filled to a definite level with water. In this are immersed powerful floats, also made of concrete, running on runners on the side of the basin. Connected by suitable means to the float is a trough, which carries the vessel to be transported from the high to the low level, or *vice versa*. The floats are capable of supporting the carriage, the trough, and the vessel transported. Now supposing it is desired to ship a vessel from the higher to the lower level, all that has to be done when the vessel is shipped into the conveying trough (by suitable gear) is to overcome the buoyancy of the floats by a suitable prime mover, *i.e.* the floats are immersed until the trough is on a level with the lower sluice-head. The reverse operation is followed when shipping from low to high level. An installation of this kind is now working on the Neckar-Danube Canal, and is said to offer considerable advantages over the ordinary system of lock or the various types of ferrying gear hitherto used.

THE Cambridge University Press has in preparation, for appearance in its Cambridge Technical Series, "Architectural Building Construction," W. R. Jaggard and F. E. Drury, vols. ii. and iii.; "Electrical Engineering," Dr. T. C. Baillie, vol. ii.; "Automobile Engineering," A. Graham Clarke; "Electrotechnical Measurements," A. E. Moore and F. Shaw; "Paper: Its Uses and Testing," S. Leicester; "Mining Geology," Prof. G. Knox and S. Ratcliffe-Ellis; "Textile Calculations—Materials, Yarns, and Fabrics," A. M. Bell; "Laboratory Note-book for Applied Mechanics and Heat Engines," F. Boulden; "Elements of Applied Optics," W. R. Bower; "Electrical Installations," C. W. Hill; "Accounting," J. B. Wardhaugh; "Chemistry for Textile Students," B. North and N. Bland; "Dyeing and Cleaning," F. W. Walker; and "Experimental Building Science," J. L. Manson, vol. ii.